The Art of Block Grafting in the Preparation of Site for an Implant

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Abstract
Currently implants in dentistry have become a successful treatment option for replacement of missing teeth or tooth. However, sufficient width and height of maxillary or mandibular alveolar ridge is a must for implant placement. Deficient ridge may occur due to trauma, other local pathologies or periodontal diseases. Retention and success of implants in insufficient ridge height becomes questionable. A correct diagnosis of the deficient ridge especially in the maxillary posterior region, whether due to pneumatization of the maxillary sinus or due to periodontal disease, needs to be made prior to deciding the treatment protocol. Surgical reconstruction of such alveolar ridge using autologous bone grafts allows implant fixation in an esthetic and functional manner. For repair of most localized alveolar defects, block bone grafts from the symphysis offer advantages over iliac crest grafts, like close proximity of donor and recipient sites, convenient surgical access, decreased donor site morbidity, decreased cost and hidden scar. We hereby present a case of deficient alveolar height in the maxillary posterior region which was reconstituted with intraoral symphysis graft from the mandible before implant placement.

Key words: Implants, Alveolar ridge augmentation, Symphysis

Introduction
Alveolar ridge resorption after tooth loss is a common phenomenon. After a tooth is extracted the alveolar ridge decreases in width and height very rapidly, with as much as 50% loss in width during the first year, two-thirds of which occurs in the initial 3 months. Restorations supported by dental implants are currently a widely accepted and successful treatment modality for the treatment of partial and complete edentulism. The availability of adequate bone volume for dental implant placement is often diminished by trauma, pathology, periodontal disease, and tooth loss.

The placement of titanium implants in sites that are deficient of alveolar ridge width has always been unpredictable due the lack of bone around the implant. Implants placed into the available bone can often lead to a compromised aesthetic result due to poor positioning and direction of the implants, especially in the aesthetic zone. Autogenous bone grafts have been used for many years for ridge augmentation and are still considered the gold standard for jaw reconstruction. Possible origins for autogenous bone include the calvarium, tibia, and iliac crest. Dental implants do not require large amounts of bone, leading to the growing use of intraoral block bone grafts from intraoral sources, especially the mandibular symphysis and ramus. Other intraoral donor sites include the maxillary tuberosity, mandibular symphysis, angle of the mandible, ramus and exostoses. We hereby present a case report of preparation of deficient alveolar ridge for the placement of implants with autogenous block graft namely, symphysis.

Case Report
A 45 year old male patient reported to our department with the chief complaint of missing tooth (maxillary right second molar) in the upper right posterior region (Fig. 1). The patient wished for a fixed prosthesis. Clinical examination and laboratory tests were done to rule out systemic diseases such as diabetes and hypertension. The maxillary right second

Fig. 1: Recipient site with alveolar ridge deficiency

Fig. 2: OPG showing horizontal bone loss between maxillary right first and third molars, with thick mucosa covering it.

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molar was missing and grade I mobility was present with third molar. Study models were prepared and radiographic examination was done which included digital orthopantomogram. OPG revealed an alveolar height of approximately 3 mm, but the vertical deficiency of the ridge was due to horizontal alveolar bone loss rather than due to the most obvious causes in maxillary posterior region i.e; pneumatization of maxillary sinus which would require a direct or indirect sinus lift procedure (Fig.2). Extraction was planned with respect to maxillary right third molar, followed by an autogenous symphysis bone graft in order to gain adequate height for placement of implant.

Fig.3: Incision marked for symphysis graft harvesting

The recipient site and donor site were prepared following standard aseptic technique. Local anaesthesia was administered at the recipient and the donor site via bilateral inferior alveolar nerve blocks and right posterior superior alveolar nerve block and greater palatine nerve block. Crestal incision was given on the recipient site, and releasing incision was given anteriorly. A full thickness mucoperiosteal flap was reflected. The defect was measured clinically and was 5 mm buccolingually and 6 mm anteroposteriorly. Defect was decorticated with no.702 straight fissure bur. The defect was packed with gauze. A vestibular degloving incision was given from cuspid to contralateral cuspid, 5 mm away from the mucogingival junction leaving adequate tissue for closure (Fig.3). Full thickness mucoperiosteal flap was raised and labial surface of mandibular symphysis was exposed till the lower border of mandible. Size of defect previously recorded was marked on the symphysis, 5 mm away from apices of mandibular anteriors, mental foramina & 4 mm from lower border of mandible.

Postage stamp method was adopted and holes were drilled with no.702 bur. Depth of the holes were limited till the medullary bone (Fig.4). Holes were joined & corticocancellous block graft was harvested using straight and curved osteotomes (Fig.5). Some amount of cancellous bone was curetted out from same donor site. Hemostasis was achieved and closure of the donor site was done (Fig.6). Harvested corticocancellous block was checked for fit over the recipient site. Any irregularities on undersurface of the graft were trimmed to achieve maximum graft-recepient site contact. Corticocancellous block graft was stabilised over the recipient site by means of 1.5 mm titanium screws of 10 mm length. Margins of the graft were smoothened (Fig.7)

Any irregularities between block graft & donor site were filled with cancellous bone chips mixed with platelet rich plasma. Raised buccal mucoperiosteal flap was replaced and checked for complete, tension free coverage. In cases where
tension on the flap was noticed, periosteal scoring was done. Recipient site was sutured (Fig.8)

Discussion
Alveolar bone defects can be surgically corrected before or at the time of implant placement. The disadvantages of the combined graft implant procedure are that graft failure implies also implant failure, and while implant osseointegration may be achieved in the apical zone, there may be no such integration in the bone in the coronal zone.

The origin of the bone used in grafting is fundamentally dependent on the size of the bone defect involved. In most cases intraoral grafts from chin, mandibular ramus, zygomatic arch, retromolar or maxillary tuberosity are used. The mandibular symphysis and ramus buccal shelf are excellent intraoral sources to obtain a cortico-cancellous or pure cortical bone block, respectively, for alveolar ridge augmentation. The symphysis has been reported to provide sufficient bone to augment a deficient ridge by 4-6mm in the horizontal dimension, and up to 4mm in the vertical dimension, covering a length of up to a 3-tooth defect. The symphysis offers over 50% larger graft volume than what can be obtained from the mandibular ramus, with much easier surgical access. The average symphysis graft has been found to be composed of 65% cortical bone and 36% cancellous bone, as opposed to the mandibular ramus, which is nearly 100% cortical in nature.

Rapid vascularization of the transplant is a prerequisite to successful osteogenesis. Cancellous transplants may be entirely penetrated by blood vessels in 2 days and completely revascularized within 2 weeks. End-to-end vascular anastomosis occurs in the cancellous transplant. The cortico-cancellous nature of bone harvested from symphysis facilitates faster vascular in-growth once the block has been placed, resulting in more rapid integration and less potential resorption during healing.

Intramembranous transplants do not produce immune reactions and are incorporated by osteoclastic resorption with a shorter healing period compared with other methods of osseous repair. The highest concentrations of promoter proteins such as bone morphogenetic proteins or osteogenin are found in the mandibular symphysis, ramus and calvaria. The mandibular symphysis is a convenient source and provides a dense cortical quality transplant. The thick cortical layer of the transplant prevents or reduces resorption.

Conclusion
A thorough clinical and radiological examination should be done in order to diagnose the exact cause of deficient ridge in maxillary posterior region, whether it is due to pneumatization of the sinus or due to horizontal bone loss of the alveolar ridge. Accordingly, judgement should be made about a sinus lift procedure or an autogenous block graft. Intramembranous autogenous osseous grafts, including the mandibular symphysis, angle of the mandible, ramus, maxillary tuberosity and intraoral exostoses, are the "gold standard" in the restoration of intraoral osseous volume especially in cases where the alveolar ridge is deficient for placement of implant. The mandibular symphysis is a useful, easy to harvest, corticocancellous graft that can be used successfully for alveolar ridge augmentation before implant placement.

References
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